IL PN BK DI8 DO4 2TX-PAC

PROFINET bus coupler, 8 inputs, 24 V DC, 4 outputs, 24 V DC, 500 mA, complete with I/O connectors

1 Description

This description applies to firmware version 2.30 or later.

The bus coupler is the link between a PROFINET network and the Inline installation system. In addition, it is used to acquire and output digital signals.

Up to 61 Inline devices can be connected at any point to an existing PROFINET network using the bus coupler.

The bus coupler and the Inline devices form one station with a maximum of 63 local bus devices. Here, the inputs and outputs of the bus coupler form the first and second local bus devices.

Features

- 2 x Ethernet twisted pair according to 802.3 with auto negotiation and auto crossover
- Transmission speed of 100 Mbps
- IP parameter setting using the PROFINET controller
- Connection to the PROFINET network via 8-pos. RJ45 socket
- Electrical isolation between Ethernet interface and logic
- Ethernet TCP/IP (100 Base-TX, Management via SNMP)
- Connection of up to 61 other Inline devices
- Connection of a maximum of 16 PCP devices
- Supported protocols: SNMPv1, TFTP, PROFINET, LLDP and MRP (from firmware 3.21)
- 8 digital inputs, 4 digital outputs
- Automatic baud rate detection on the local bus (500 kbps or 2 Mbps)
- Diagnostic and status indicators
- Hardware version 02 or later:
  Approved for use in zone 2 potentially explosive areas

WARNING: Explosion hazard when used in potentially explosive areas

When using the terminal in potentially explosive areas, observe the corresponding notes.

This data sheet is only valid in association with the IL SYS INST UM E user manual.

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3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PROFINET bus coupler, 8 inputs, 24 V DC, 4 outputs, 24 V DC, 500 mA, complete with I/O connectors	IL PN BK DI8 DO4 2TX-PAC	2703994	1

Accessories	Type	Order No.	Pcs. / Pkt.
Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, width: 9.5 mm, color: gray (Assembly)	CLIPFIX 35	3022218	50
Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems, Plotter: Laser printer, Mounting type: Insert, Lettering field: 62 x 46 mm (Marking)	ESL 62X46	0809502	5
Labeling field, width: 48.8 mm (Marking)	IB IL FIELD 8	2727515	10
Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems, Plotter: Laser printer, Mounting type: Insert, Lettering field: 62 x 10 mm (Marking)	ESL 62X10	0809492	1
Labeling field, width: 12.2 mm (Marking)	IB IL FIELD 2	2727501	10
RJ45 connector, shielded, with bend protection sleeve, 2 pieces, gray for straight cables, for assembly on site. For connections that are not crossed, it is recommended that you use the connector set with gray bend protection sleeve. (Connector/Adapter)	FL PLUG RJ45 GR/2	2744856	1
RJ45 connector, shielded, with bend protection sleeve, 2 pieces, green for crossed cables, for assembly on site. For connections that are crossed, it is recommended that the connector set with green bend protection sleeves is used. (Connector/Adapter)	FL PLUG RJ45 GN/2	2744571	1
CAT5-SF/UTP cable (J-02YS(ST)C HP 2 x 2 x 24 AWG), heavy-duty installation cable, 2 x 2 x 0.22 mm^2, solid conductor, shielded, outer sheath: 7.8 mm diameter, inner sheath: 5.75 mm ± 0.15 mm diameter (Cable/conductor)	FL CAT5 HEAVY	2744814	1
CAT5-SF/UTP cable (J-LI02YS(ST)C H 2 x 2 x 26 AWG), light-duty, flexible installation cable 2 x 2 x 0.14 mm^2, stranded, shielded, outer sheath: 5.75 mm ± 0.15 mm diameter (Cable/conductor)	FL CAT5 FLEX	2744830	1
Crimping pliers, for assembling the RJ45 plugs FL PLUG RJ45..., for assembly on site (Tools)	FL CRIMPTOOL	2744869	1
End clamp, for assembly on NS 32 or NS 35/7.5 DIN rail (Assembly)	E/UK	1201442	50
Connector set, for Inline bus coupler with I/Os mounted in rows (Connector/Adapter)	IL BKDIO-PLSET	2878599	1

Documentation	Type	Order No.	Pcs. / Pkt.
User manual, English, Automation terminals of the Inline product range	IL SYS INST UM E	-	-
Quick Start Guide, English, for PC Worx	UM QS EN PC WORX	-	-
Quick Start Guide, English, for planning INTERBUS devices in a PROFINET network	UM QS EN PROFINET PROXY IB	-	-
User manual, English, for the Modular Managed Switch System	FL SWITCH MM HS UM E	-	-
Application note, English, Inline terminals for use in zone 2 potentially explosive areas	AH EN IL EX ZONE 2	-	-
Application note, German/English, I/O modules at bus couplers	AH IL BK IO LIST	-	-
Application note, English, Firmware update for devices supporting a TFTP firmware update	AH EN TFTP FIRMWARE UPDATE	-	-
User manual, English, PROFINET basics	UM EN PROFINET SYS	-	-

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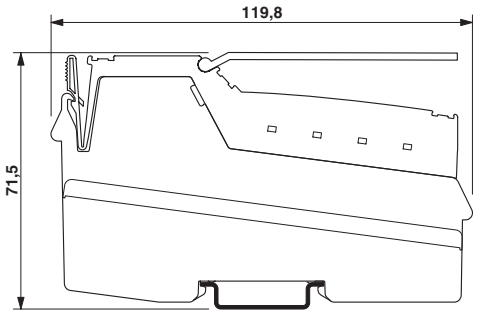
4 Technical data

Dimensions (nominal sizes in mm)



Width	80 mm
Height	119.8 mm
Depth	71.5 mm
Note on dimensions	Specfications with connectors

General data

Color	green
Weight	375 g (with connectors)
Ambient temperature (operation)	-25 °C ... 55 °C (observe derating)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	10 % ... 95 % (according to DIN EN 61131-2)
Permissible humidity (storage/transport)	10 % ... 95 % (according to DIN EN 61131-2)
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III, IEC 61140, EN 61140, VDE 0140-1

Connection data

Designation	Inline connector
Connection method	Spring-cage connection
Conductor cross section solid / stranded	0.08 mm² ... 1.5 mm² / 0.08 mm² ... 1.5 mm²
Conductor cross section [AWG]	28 ... 16
Stripping length	8 mm

Connection data for UL approvals

Designation	Inline connector
Connection method	Spring-cage connection
Conductor cross section solid / stranded	0.2 mm² ... 1.5 mm² / 0.2 mm² ... 1.5 mm²
Conductor cross section [AWG]	24 ... 16
Stripping length	8 mm

Interface PROFINET

Number	2
Connection method	RJ45 socket, auto negotiation
Transmission speed	100 MBit/s (acc. to PROFINET standard)
Transmission physics	Ethernet in RJ45 twisted pair
Transmission length	max. 100 m

Interface Inline local bus

Connection method	Inline data jumper
Transmission speed	500 kBit/s / 2 MBit/s (Automatic detection, no combined system)

System limits

Amount of process data	max. 488 Byte (Max. 244 bytes IN - max. 244 bytes OUT)
IN process data for I/O modules that can be aligned	244 Byte
OUT process data for I/O modules that can be aligned	244 Byte
Number of supported devices	max. 63 (per station)
Number of local bus devices that can be connected	max. 61 (on board I/Os are two devices)
Number of devices with parameter channel	max. 16

Observe the logic current consumption of each device when configuring an Inline station! It is specified in every terminal-specific data sheet. The current consumption can differ depending on the individual terminal. The permissible number of devices that can be connected therefore depends on the specific station structure.

PROFINET

Device function	PROFINET device
Update rate	min. 1 ms (depending on the size of the bus system)

Protocols supported

Protocols supported	PROFINET, PDev, TFTP, ICMP, LLDP

Power supply for module electronics

Connection method	Spring-cage connection
Designation	Bus coupler supply U_{BC}; Communications power U_L (7.5 V) and the analog supply U_{ANA} (24 V) are generated from the bus coupler supply.
Supply voltage	24 V DC (via Inline connector)
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption	typ. 138 mA (from U_{BK}) max. 0.91 A DC (from U_{BK})
Power loss	typ. 3 W (entire device)

Power consumption

NOTE: Electronics may be damaged when overloaded

Provide external fuses for the 24 V areas U_{BK}, U_M, and U_S. The power supply unit must be able to supply four times the nominal current of the external fuse, to ensure that it trips in the event of an error.

Main circuit supply U_M	24 V DC
Supply voltage range U_M	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Power supply at U_M	max. 8 A DC (Sum of $U_M + U_S$; 4 A, maximum, when used in potentially explosive areas.)
Current consumption from U_M	max. 8 A DC
Segment supply voltage U_S	24 V DC
Supply voltage range U_S	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Power supply at U_S	max. 8 A DC (Sum of $U_M + U_S$; 4 A, maximum, when used in potentially explosive areas.)
Current consumption from U_S	max. 8 A DC

Power consumption	
Communications power U_L	7.5 V DC ±5 %
Power supply at U_L	max. 0.8 A DC
I/O supply voltage U_{ANA}	24 V DC
Supply voltage range U_{ANA}	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Power supply at U_{ANA}	max. 0.5 A DC

Digital inputs	
Number of inputs	8 (EN 61131-2 type 1)
Connection method	Inline connector
Connection method	2, 3-wire
Input characteristic curve	IEC 61131-2 type 1
Nominal input voltage	24 V DC
Input voltage	24 V DC
Nominal input current	typ. 3 mA
Current flow	Limited to 3 mA, maximum
Input voltage range "0" signal	-30 V DC ... 5 V DC
Input voltage range "1" signal	15 V DC ... 30 V DC
Delay at signal change from 0 to 1	typ. 5 ms
Delay at signal change from 1 to 0	typ. 5 ms
Permissible conductor length to the sensor	100 m
Protection against polarity reversal	Polarity protection diode

Digital outputs	
Number of outputs	4
Connection method	Inline connector
Connection method	2, 3-wire
Nominal output voltage	24 V DC
Voltage difference with nominal current	< 1 V
Maximum output current per channel	500 mA
Maximum output current per device	2 A
Nominal load, ohmic	12 W
Nominal load, inductive	12 VA (1.2 H; 48 Ω)
Nominal load, lamp	12 W
Signal delay	typ. 1.2 ms
Signal delay when switching on an ohmic nominal load	max. 50 µs (in the case of 0.5 A load)
Signal delay when switching off an ohmic nominal load	max. 250 µs (in the case of 0.5 A load)
Maximum operating frequency with inductive nominal load	0.5 Hz (1.2 H; 48 Ω)
Reaction time with short-circuit	1,2 ms
Behavior at voltage switch-off	The output follows the power supply without delay
Limitation of the voltage induced on circuit interruption	approx. -30 V
Output current when switched off	max. 10 µA (When not loaded, a voltage can be measured even at an output that is not set.)
Behavior with overload	Auto restart
Behavior with inductive overload	Output can be destroyed
Reverse voltage resistance to short pulses	Reverse voltage proof
Resistance to permanent reverse voltage	max. 2 A
Overcurrent shut-down	min. 0.7 A
Short-circuit and overload protection	Free running circuit In output driver

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Configuration data

IN process data for I/O modules that can be aligned	244 Byte
OUT process data for I/O modules that can be aligned	244 Byte

Error messages to the higher level control or computer system

Short-circuit / overload of the digital outputs	Yes
Sensor supply failure	Yes
Failure of the actuator supply	Yes

Protective circuit

Surge protection, protection against polarity reversal of the supply voltage	35 V suppressor diode

Mechanical tests

Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6	5g
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	Operation: 25g, 11 ms duration, semi-sinusoidal shock impulse

Conformance with EMC Directive 2004/108/EC

Noise immunity test in accordance with EN 61000-6-2	
Electrostatic discharge (ESD) EN 61000–4–2/IEC 61000–4–2	Criterion B; 6 kV contact discharge, 8 kV air discharge
Electromagnetic fields EN 61000–4–3/IEC 61000–4–3	Criterion A; Field intensity: 10 V/m
Fast transients (burst) EN 61000–4–4/IEC 61000–4–4	Criterion A; all interfaces 1 kV Criterion B; all interfaces 2 kV
Transient surge voltage (surge) EN 61000–4–5/IEC 61000–4–5	Criterion B; supply lines DC: 0.5 kV/0.5 kV (symmetrical/asymmetrical); fieldbus cable shield 1 kV
Conducted interference EN 61000–4–6/IEC 61000–4–6	Criterion A; Test voltage 10 V
Noise emission test as per EN 61000-6-4	
EN 55011	Class A

Approvals

For the latest approvals, please visit phoenixcontact.net/products.

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Mounting position and derating

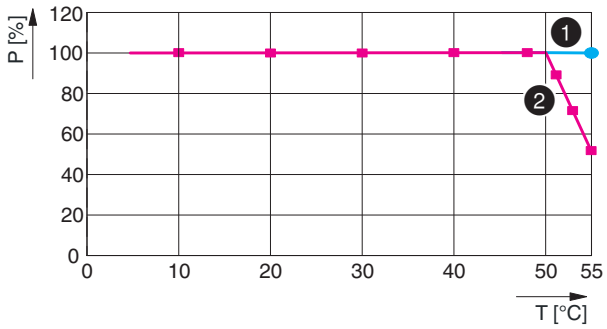

Figure 1 Derating with different mounting positions

Key:

1	Mounting on a horizontal DIN rail
2	Different mounting position
P [%]	Power dissipation in percent
T [°C]	Ambient temperature in °C

The specifications refer to a supply voltage of 24 V.

When you are working with a voltage from the upper voltage range (e.g., 30 V), the percentage values increase. In this case, multiply the percentage values with 1.25 (30 V/24 V = 1.25).

The various bus coupler functions have different percentage shares of the power dissipation.

Please refer to the percentage shares in the following table.

Function	Percentage shares of power dissipation in %
Inputs	25
Outputs	16
U_M	24
U_{ANA}	3
U_L	32

The following results from the information given above:

– When used at 55°C (on horizontal DIN rail)
When mounted on a horizontal DIN rail, you can operate the bus coupler at 55°C and 24 V without any limitation.

– When used at 55°C (different mounting position)
With a different mounting position, you can operate the bus coupler at 55°C and 24 V with a maximum load of 50%.

5 Internal circuit diagram

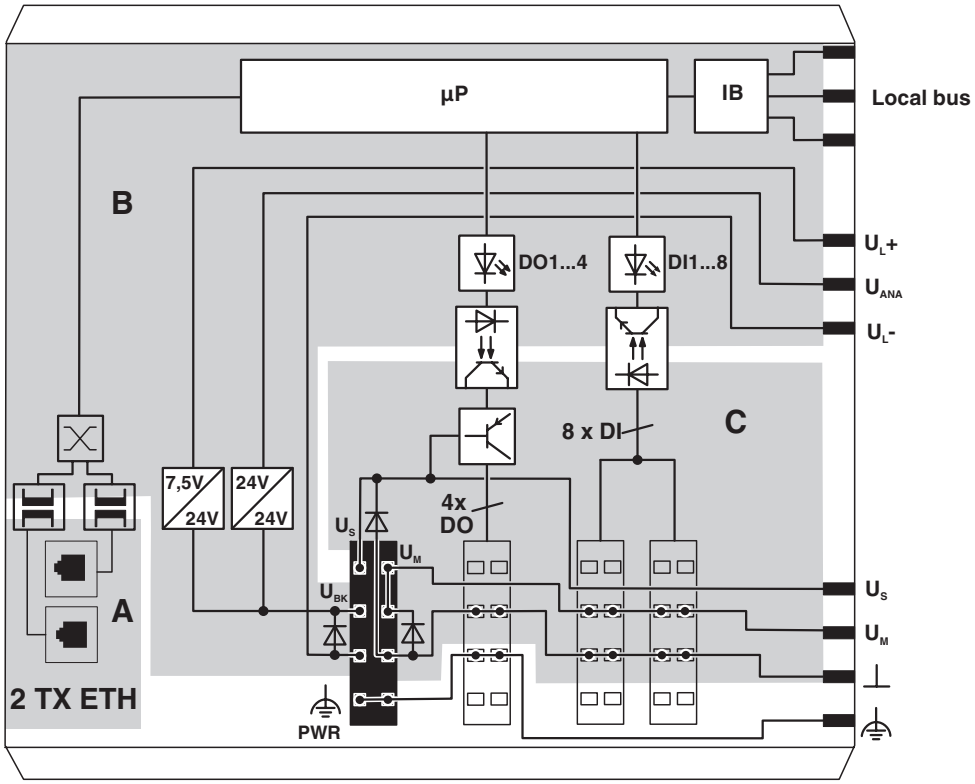

Figure 2 Internal wiring of connections

Key:

µP — Microprocessor

IB — Protocol chip

LED

Optocoupler

PNP transistor

Ethernet switch

Transmitter with electrical isolation

The gray areas in the basic circuit diagram represent the electrically isolated areas:

A: Ethernet interface

B: Logic

C: I/O

Explanation for other used symbols has been provided in the IL SYS INST UM E user manual.

6 Local status and diagnostic indicators

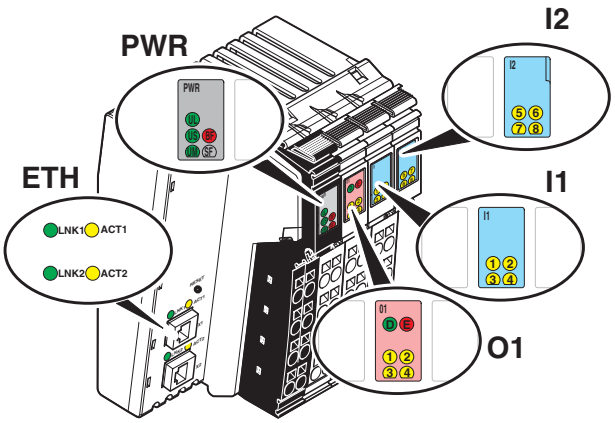

Figure 3 Local status and diagnostic indicators

Designation	Color	Meaning	State	Description
LNK 1/2	green	**Link** port 1/2	ON	Connection via Ethernet to a module via port 1/2 established
			Flashing	PROFINET module identification ("flashing")
			OFF	No connection established via port 1/2
ACT 1/2	yellow	**Act**ivity port 1/2	ON	Transmission or reception of Ethernet telegrams at port 1/2
			OFF	No transmission or reception of Ethernet telegrams at port 1/2
BF	red	Communication error (**B**us**F**ail)	ON	No link status available
			Flashing	Link status available, no communication connection to the PROFINET controller
			OFF	A PROFINET controller has established an active communication connection to the PROFINET device.
SF	red	System failure (PROFINET)	ON	PROFINET diagnostics available
			OFF	PROFINET diagnostics not available
UL	green	U_{Logic}	ON	24 V bus coupler supply/7.5 V communications power present
			OFF	24 V bus coupler supply/7.5 V communications power not present
US	green	$U_{Segment}$	ON	24 V segment circuit supply present
			OFF	24 V segment circuit supply not present
UM	green	U_{Main}	ON	24 V main circuit supply/internal communications power present
			OFF	24 V main circuit supply/internal communications power present
D	green	**D**iagnostics	ON	Data transmission active within the station
			Flashing	Data transmission not active within the station
E	red	**E**rror	ON	I/O error, short-circuit/overload of outputs
			OFF	No I/O error
1 ... 4	yellow	O1	ON/OFF	Output is set/not set.
1 ... 8	yellow	I1, I2	ON/OFF	Input is set/not set.

7 Diagnostic indicators for PROFINET

States during operation

LED	Meaning
SF OFF/BF flashing	PROFINET device is waiting for communication with the PROFINET controller.
SF OFF/BF OFF	PROFINET controller was able to establish communication without errors.

States in the event of an error

LED	Meaning	Measure/remedy in the event of an error
SF OFF/BF flashing	The logic communication connection has been interrupted. The PROFINET controller can no longer be accessed.	Check the connection between the PROFINET controller and the PROFINET device. Make sure that the PROFINET device name of the PROFINET device is identical with the configuration.
SF OFF/BF flashing	The PROFINET device is not assigned a PROFINET device name.	Assign the PROFINET device name using the relevant tool.
SF OFF/BF ON	The physical communication path has been interrupted. The PROFINET controller can no longer be accessed.	Restore the physical connection between the PROFINET controller and the PROFINET device.
SF ON/BF OFF	Diagnostic data is available.	Read the diagnostic message using the relevant tool.
SF flashing/ BF flashing	Hardware watchdog has been triggered.	

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8 Connection of PROFINET, power supply, actuators, and sensors

8.1 Connecting PROFINET

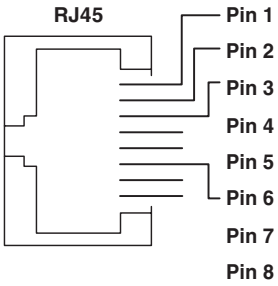

Figure 4 Pin assignment of the Ethernet socket (RJ45)

Connect PROFINET to the bus coupler via an 8-pos. RJ45 connector.

Only one twisted pair cable with an impedance of 100 Ω may be connected to each Ethernet interface in RJ45 format. The data transmission speed is 100 Mbps. The 100Base-TX port of the bus coupler is able to detect a pair of incorrectly connected receive cables (RD+/RD-) and to correct them using the auto polarity correction function.

For the pin assignment, please refer to the following table:

Pin	Assignment
1	TxD + (transmit data +)
2	TxD - (transmit data -)
3	RxD+ (receive data +)
4	Reserved
5	Reserved
6	RxD- (receive data -)
7	Reserved
8	Reserved

Auto crossover
Both Ethernet interfaces are provided with the auto crossover function.

Shielding
The shielding ground of the connected twisted pair cables is electrically connected with the socket. When connecting network segments, avoid ground loops, potential transfers, and voltage equalization currents via the braided shield.

Observe bending radii
The housing dimensions specified under "Dimensions" refer to the bus coupler with I/O connectors without Ethernet connection. When installing the bus coupler in a control box, observe the bending radii of the Ethernet cables and the connectors used (e.g., FL CAT5 FLEX: 30 mm for fixed installation and FL CAT5 HEAVY: 30 mm without outer sheath and 45 mm with outer sheath). If required, use angled RJ45 connectors to maintain these bending radii.

8.2 Terminal point assignment of the Inline connectors

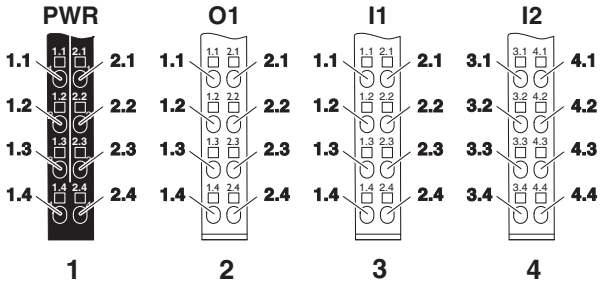

Figure 5 Terminal point assignment

Terminal point assignment of the power plug PWR (1)

Terminal point	Assignment	Terminal point	Assignment
1.1	U_S	2.1	U_M
1.2	U_{BK}	2.2	U_M
1.3	GND U_{BK}	2.3	GND U_M, U_S
1.4	Functional earth ground (FE)	2.4	Functional earth ground (FE)

NOTE: Malfunction

The module is designed exclusively for SELV operation according to IEC 950/EN 60950/ VDE 0805.

For information on the power supplies, please refer to the IL SYS INST UM E user manual.

Terminal points 1.3 and 2.3 on the connector can be jumpered if the same reference potential is to be used for the communications power and the segment voltage.

Terminal point assignment of the output plug O1 (2)

Terminal point	Assignment	Terminal point	Assignment
1.1	OUT1	2.1	OUT2
1.2	GND	2.2	GND
1.3	FE	2.3	FE
1.4	OUT3	2.4	OUT4

Terminal point assignment of the input plug I1 (3)

Terminal point	Assignment	Terminal point	Assignment
1.1	IN1	2.1	IN2
1.2	U_M	2.2	U_M
1.3	GND	2.3	GND
1.4	IN3	2.4	IN4

Terminal point assignment of the input plug I2 (4)

Terminal point	Assignment	Terminal point	Assignment
3.1	IN5	4.1	IN6
3.2	U_M	4.2	U_M
3.3	GND	4.3	GND
3.4	IN7	4.4	IN8

9 Connection example

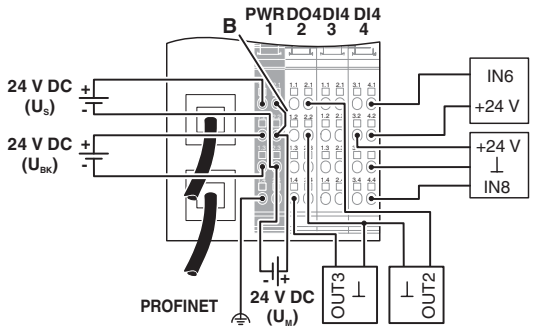

Figure 6 Connection example

10 Notes on using the terminal block in potentially explosive areas

WARNING: Explosion hazard

Please make sure that the following notes and instructions are observed.

Approval according to EC directive 94/9/EC

Ⓔx II 3 G Ex nA IIC T4 Gc X

Installation notes

1. This Inline terminal is a category 3 device and is suitable for installation in the potentially explosive areas of zone 2.
   The device meets the requirements of EN 60079–0:2012 and EN 60079–15:2010.
2. The Inline terminal must only be installed, operated, and maintained by qualified personnel.
3. Please follow the installation instructions given in the IL SYS INST UM E user manual and the package slip.
4. When installing and operating the device, the applicable safety directives (including national safety directives), accident prevention regulations, as well as general technical regulations, must be observed.
5. For the safety data, please refer to the corresponding documentation (user manual, data sheet, package slip) and the certificates (declaration of conformity and other approvals, if applicable).
6. Access to the circuits inside the Inline terminal is not permitted. Do not repair the Inline terminal by yourself but replace it with a terminal of the same type.
   Repairs may only be performed by the manufacturer. The manufacturer is not liable for damage resulting from noncompliance.
7. The IP20 degree of protection (EN 60529) of the device is intended for a clean and dry environment.
8. Do not subject the Inline terminal to mechanical strain and/or thermal loads, which exceed the limits specified in the product documentation.
9. The Inline terminal is not designed for use in atmospheres with a danger of dust explosions.
   If dust is present, install the device in suitable, approved housing. Please note the surface temperature of the housing.

Installation in zone 2

1. Observe the specified conditions for use in potentially explosive areas.
2. Install the device in a suitable approved housing (with at least IP54 degree of protection) that meets the requirements of EN 60079-15. Observe the requirements of EN 60079-14.
3. In potentially explosive areas, only snap the device onto the DIN rail and remove it from the DIN rail and connect and disconnect the cables when the power is disconnected.
4. In zone 2, only connect devices to the supply and signal circuits that are suitable for operation in potentially explosive areas of zone 2 and the conditions at the installation location.

Restrictions/limit values

1. **Only Inline terminals that are approved for use in potentially explosive areas may be assembled on this Inline terminal.**
   Before using an Inline terminal in a zone 2 potentially explosive area, check whether it has been approved for installation within this area.
   For a list of terminals that are approved for the potentially explosive areas of zone 2, please refer to the AH EN IL EX ZONE 2 application note.
2. Please ensure that the **supplies of U_M and U_S** at the bus coupler do not exceed **4 A**.
3. Please make sure that the **maximum permissible current of 4 A** flowing through potential jumpers U_M und U_S (total current) is not exceeded when using the Inline terminals in potentially explosive areas.
4. Also ensure that the **maximum permissible current of 0.8 A** flowing through potential jumper U_L is not exceeded.

11 Mapping inputs and outputs to PROFINET

The module uses the following input and output data words:

Slot	Data length
Slot 0	-
Slot 1	4 words IN/4 words OUT (local bus master)
Slot 2	1 byte OUT (DO4)
Slot 3	1 byte IN (DI8)

12 Process data

12.1 Terminal point assignment of local outputs to the OUT process data

Byte	0							
Bit	7	6	5	4	3	2	1	0
Slot	Not used				2 (O1)			
Terminal point (signal)					2.4	1.4	2.1	1.1
Terminal point (GND)					2.2	1.2	2.2	1.2
Terminal point (FE)					2.3	1.3	2.3	1.3
Status indicator, LED					4	3	2	1

12.2 Terminal point assignment of the local inputs to the IN process data

Byte	0							
Bit	7	6	5	4	3	2	1	0
Slot	4 (I2)				3 (I1)			
Terminal point (signal)	4.4	3.4	4.1	3.1	2.4	1.4	2.1	1.1
Terminal point (GND)	4.3	3.3	4.3	3.3	2.3	1.3	2.3	1.3
Terminal point (24 V)	4.2	3.2	4.2	3.2	2.2	1.2	2.2	1.2
Status indicator, LED	8	7	6	5	4	3	2	1

13 Startup

Make sure you always use the latest version of the FDCML/GSDML file and the latest documentation for the bus coupler. The latest files and documentation can be found on the Internet at phoenixcontact.net/products.

Default upon delivery/default settings

By default upon delivery, the following functions and features are available:

PROFINET name:	No name assigned
IP parameters:	none
Module designation:	IL PN BK DI8 DO4 2TX
Vendor ID:	$00B0_{hex}$
Device ID:	$000A_{hex}$

Reset button

The reset button is on the front of the bus coupler.

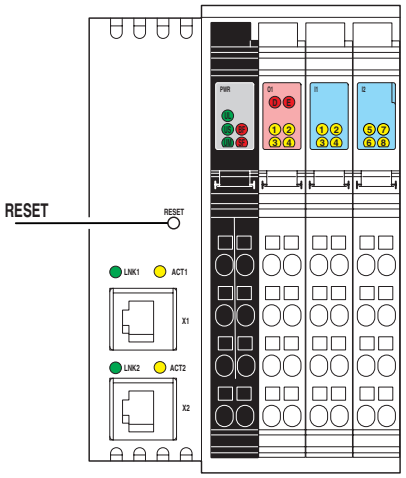

Figure 7 Reset button

The bus coupler is restarted by pressing the reset button. The outputs of the Inline station are reset. The process image of the inputs is not re-read.

Firmware started

Once you have supplied the bus coupler with power or pressed the reset button, the firmware is started. After completion of the firmware boot process the BF LED is either on or flashing.

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Documentation

How to assign the PROFINET names and the IP address as well as how to startup a device within a PROFINET system is described in the following documents:

- "PC WORX" quick start guide

- "Configuring INTERBUS devices in a PROFINET network using the example of STEP 7" quick start guide

For the order designations, please refer to the odering data.

The documentation can be found on the Internet at phoenixcontact.net/products.

14 Parameterization

PC Worx

Parameterization of the PROFINET devices in PC Worx requires at least PC Worx version 5.0. An online data sheet of the device with important technical data and a configuration file are integrated into PC Worx. If several versions of the configuration file are available, make sure that you are working with the file version that corresponds to the firmware/ hardware version being used.

Other tools

The PROFINET device is parameterized using the configuration tool of the PROFINET controller. Please integrate the corresponding GSDML file of the bus coupler into the relevant software tool (STEP 7/HW Config, ...).

Make sure you always use the latest version of the FDCML/GSDML file and the latest documentation for the bus coupler. The latest files and documentation can be found on the Internet at phoenixcontact.net/products.

Parameter

Slot 0: Diagnostic alarms

- PROFINET alarm behavior
  - Local bus diagnostics
  - I/O diagnostics
  - Indicate return of local module
- Local bus settings
  - Automatic start after local bus error
  - Automatic start delay

Slot 1: -

PC Worx: All registers are mapped to system variables.

Step 7: There are four words of input data and four words of output data.

Word	Input data	Output data
1	Diagnostic status register	Standard function start register
2	Diagnostic parameter register	Standard function parameter register
3	Extended diagnostic parameter register	Reserved
4	Standard function status register	Reserved

Diagnostic alarms

PROFINET enables the PROFINET device to store diagnostic information together with the error location and error type.

An incoming alarm informs the PROFINET controller that diagnostic information has been stored. The alarms are only transmitted if they have been enabled via parameters during startup.

When the diagnostic information has been removed, an outgoing alarm is transmitted to the controller.

If at least one piece of diagnostic information is stored, the SF LED is on. If no diagnostic information is present, the SF LED is off.

Substitute value behavior

In the event of an local bus error or a device error of the bus coupler, all Inline station outputs (including analog outputs) are set to "0".

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15 Firmware update

In order to update the firmware of the bus coupler, the device must be provided with a firmware container via a TFTP server. You can use any TFTP server, e.g., Factory Manager.

The TFTP FIRMWARE UPDATE application note describes how to update the firmware using the Factory Manager.
This document can be found on the Internet at phoenixcontact.net/products.

When updating to firmware version 3.21, the device name and all IP addresses stored in the retentive memory will be lost.

16 Physical Device - PDev

The module supports all devices of the PDev according to PROFINET.

PDev is a description of Ethernet interfaces and their features standardized in PROFINET. This includes, for example, the IP and MAC address, diagnostic and neighboring information, and parameterization settings.

17 Link Layer Discovery Protocol - LLDP

The device supports LLDP according to IEEE 802.1 AB and thus enables topology detection of devices that also have LLDP activated.

Advantages of using LLDP:

– Improved error location detection
– Improved device replacement
– More efficient network configuration

The following information is received by or sent to neighbors, as long as LLDP is activated:

– The device sends its own management and connection information to neighboring devices.
– The device receives management and connection information from neighboring devices.

Displaying LLDP information

Engineering tools can be used to represent the LLDP information as a topology overview.

For additional information on LLDP, please refer to the FL SWITCH MM HS UM E user manual.

18 Device replacement

Devices can be replaced without having to reconfigure them within the PROFINET network. The station name and address are assigned by the control system to the newly added PROFINET bus coupler using the neighborhood detection function.

Device replacement is possible for Phoenix Contact PROFINET controllers from firmware version 3.0 onwards.

19 Applicative system redundancy for process data

Applicative system redundancy is only provided for process data but not for parameter data.

Acyclic communication allows two PROFINET controllers (primary and backup) to communicate with the same bus coupler.

Parallel PCP services are not supported. This means, if a second PROFINET controller tries to access a PCP device while there is a another PROFINET controller with a service pending, the second service request is rejected by the bus coupler.

With regard to communication, no distinction is made between the "primary" (process controlling) and the "backup" controller.

20 Failsafe behavior

In the event of a network failure, previously determined I/O values are output.

If PROFINET communication fails, all output process data is set to zero. The local bus continues to run using these values.

Substitute values are not parameterized.

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21 Acyclic PROFINET communication

The bus coupler enables acyclic access to intelligent local bus devices (PCP devices) using PROFINET (Record Read function block, Record Write function block).

22 Mailbox communication

The bus coupler supports acyclic mailbox communication. This means specific PLC blocks allow acyclic transmission of firmware services (e.g., Read-Value, PCP) from the control system to the PROFINET device or PCP device with the Record Read and Record Write PROFINET services.

Additional PCP information can be found in the IBS SYS PCP G4 UM E user manual.

23 Dynamic configuration on the local bus

Dynamic configuration is the specification and configuration of a maximum configuration. Any subgroup of this maximum configuration can be operated.

A maximum local bus configuration can be specified here. In this configuration, individual local bus devices can be inactivated in the configuration frame (switch code 0004_{hex}) using the "Control Active Configuration" firmware service (0713_{hex}). The device may not remain in the data ring and must be jumpered manually.

Jumpering the devices does not change the position of process data.

Dynamic configuration is only possible through the application.

24 Byte rotation for 16 and 32-channel Inline terminals with a SIMATIC® S7 controller

To adapt the data format of the 16 and 32-channel Inline terminals to the data format of a SIMATIC® S7 controller, you can rotate the I/O data arrangement with device parameters.

This adaptation can only be made once and is then valid for all DI16/DO16 and all DI32/DO32 terminals.

24.1 Byte rotation for IB IL 24 DI 16... and IB IL 24 DO 16... terminals

Default

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Slot		4				3				2				1			
Terminal point		8.4	7.4	8.1	7.1	6.4	5.4	6.1	5.1	4.4	3.4	4.1	3.1	2.4	1.4	2.1	1.1

Rotated

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Slot		2				1				4				3			
Terminal point		4.4	3.4	4.1	3.1	2.4	1.4	2.1	1.1	8.4	7.4	8.1	7.1	6.4	5.4	6.1	5.1

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24.2 Byte rotation for IB IL 24 DI 32... and IB IL 24 DO 32... terminals

Default

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Slot		4								3							
Terminal point		8.4	7.4	8.3	7.3	8.2	7.2	8.1	7.1	6.4	5.4	6.3	5.3	6.2	5.2	6.1	5.1

(Word.bit) view	Word	Word 1															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 2								Byte 3							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Slot		2								1							
Terminal point		4.4	3.4	4.3	3.3	4.2	3.2	4.1	3.1	2.4	1.4	2.3	1.3	2.2	1.2	2.1	1.1

Rotated

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Slot		1								2							
Terminal point		2.4	1.4	2.3	1.3	2.2	1.2	2.1	1.1	4.4	3.4	4.3	3.3	4.2	3.2	4.1	3.1

(Word.bit) view	Word	Word 1															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.Bit) view	Byte	Byte 2								Byte 3							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Slot		3								4							
Terminal point		6.4	5.4	6.3	5.3	6.2	5.2	6.1	5.1	8.4	7.4	8.3	7.3	8.2	7.2	8.1	7.1